

AMENDMENT UNDER 35 U.S.C. § 1.111
Appln. No. 10/003,415

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A powders-affixed nonwoven fabric prepared, as a starting material for said powders-affixed nonwoven fabric, only from a powders-containing fiber web comprising powder materials and fine short fibers having a fiber diameter of 4 μm or less and a fiber length of 3 mm or less, wherein said powder materials and said fine short fibers are in a dispersed state in said powders-containing fiber web, said powders-containing fiber web ~~being~~ is formed by a method other than a wet-laid method, said fine short fibers consist of island components remaining after removing a sea component from islands-in-sea type fibers, or fibers derived from mechanically dividable fibers, and said fine short fibers are bonded by a fusion thereof.

2. (original): : The powders-affixed nonwoven fabric according to claim 1, wherein an average particle size of the powder materials is 50 μm or less.

3. (original): : The powders-affixed nonwoven fabric according to claim 1, wherein a mass ratio of the fine short fibers with respect to a whole mass of the powders-affixed nonwoven fabric is 1 to 40 mass %.

4. (original): The powders-affixed nonwoven fabric according to claim 1, wherein an adhesion rate of substances adhered to said powder-affixed nonwoven fabric is 0.5 mass % or less.

5. (original): The powders-affixed nonwoven fabric according to claim 1, wherein the fine short fibers are formed from island components remaining after removing a sea component from islands-in-sea type fibers.

6. (original): The powders-affixed nonwoven fabric according to claim 1, wherein the fine short fibers are formed from one or more organic components.

7. (currently amended): A process for manufacturing a powders-affixed nonwoven fabric comprising the steps of:

ejecting aggregates of fine short fibers having a fiber diameter of 4 μm or less and a fiber length of 3 mm or less, or a group of the aggregates, and/or mechanically dividable fibers capable of generating fine short fibers having a fiber diameter of 4 μm or less and a fiber length of 3 mm or less, or aggregates of the mechanically dividable fibers, together with powder materials, from a nozzle into a gas by an action of a compressed gas, to thereby divide the aggregates of the fine short fibers or the group thereof into the fine short fibers, and/or divide the mechanically dividable fibers or the aggregates thereof into the fine short fibers, and disperse the resulting fine short fibers and the powder materials;

collecting the dispersed fine short fibers and the powder materials to form a powders-containing fiber web; and affixing the powder materials by a fusion of the fine short fibers, while forming a nonwoven fabric from the powders-containing fiber web to obtain the powders-affixed nonwoven fabric.

8. (original): The process according to claim 7, wherein bundled aggregates of fine short fibers are supplied to the nozzle.

9. (original): The process according to claim 7, wherein before supplying the fine-fibers aggregates or the group thereof, and/or the mechanically dividable fibers or the aggregates thereof to the nozzle, adhered substances are removed from the fine-fibers aggregates or the group thereof, and/or the mechanically dividable fibers or the aggregates thereof.

10. (original): The process according to claim 7, wherein a gas stream supplied to the nozzle is substantially a laminar flow.

11. (original): The process according to claim 7, wherein the fine-fibers aggregates or the group thereof, and/or the mechanically dividable fibers or the aggregates thereof, and the powder materials are ejected from the nozzle and brought into collision with a colliding means placed in front of the nozzle.

12. (currently amended): A sheet material comprising at least one layer of the a powder-affixed nonwoven fabric according to claim 1 ~~prepared from a fiber web comprising powder materials and fine short fibers having a fiber diameter of 4 μ m or less and a fiber length of 3 mm or less in a dispersed state in said powders containing fiber web, said powders containing fiber web being formed by a method other than a wet laid method.~~

13. (original): The sheet material according to claim 12, further comprising a layer free of the powder materials on at least one surface.

14. (currently amended): A process for manufacturing a sheet material comprising the steps of:

ejecting aggregates of fine short fibers having a fiber diameter of 4 μ m or less and fiber length of 3 mm or less, or a group of the aggregates, and/or mechanically dividable fiber capable of generating fine-short fibers having a fiber diameter of 4 μ m or less and a fiber length of 3 mm or less, or aggregates of the mechanically dividable fibers, together with powder materials, from a nozzle into a gas by an action of a compressed gas, to thereby divide the aggregates of the fine short fibers or the group thereof into the fine short fibers, and/or divide the mechanically dividable fibers or the aggregates thereof into the fine short fibers, and disperse the resulting fine short fibers and the powder materials;

collecting the dispersed fine short fibers and the powder materials to form a powders-containing fiber web; and affixing the powder materials by a fusion of the fine short fibers, while forming a nonwoven fabric from the powders-containing fiber web, and at the same time

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bonding a layer free of the powder materials, to obtain the sheet material containing a powders-
affixed nonwoven fabric.

REMARKS

Characteristic features of the present invention

The important features of the powders-affixed nonwoven fabric of the present invention as set forth in amended claim 1 of the present invention as set forth in amended claim 1 of the present application reside in (i) that the powders-affixed nonwoven fabric contains the “fine short fibers having a fiber diameter of 4 μ m or less and a fiber length of 3 mm or less, and consisting of island components remaining after removing a sea component from islands-in-sea type fibers or fibers derived from mechanically dividable fibers”, (ii) that the fine short fibers are bonded to each other as well as the powder materials by a fusion thereof, and (iii) that the powders-affixed nonwoven fabric is prepared, as a starting material thereof, only from the powders-containing fiber web wherein the powder materials, are merely contained in the fiber web.

Because of the fusion of such fine short fibers, the powder materials rarely drop from the powders-affixed nonwoven fabric of the present invention, in spite of the fact that the powders-affixed nonwoven fabric is prepared only from the powders-containing fiber web.

The Groeger Reference (U.S. Patent No. 5,885,696)

The Groeger Reference discloses a fibrous web comprising a first densified fibrous web 10, a second densified fibrous web 26, and an open fibrous matrix 16, which contains functional particles 24 and is sandwiched between the first densified fibrous web 10 and the second densified fibrous web 26 (see Fig. 3 and column 8, lines 7-40). As is apparent from Fig. 3, the fibrous web disclosed in the Groeger Reference comprises not only particle-loaded areas 50, but also an area 60, which is free of the particles and surrounds the particle-loaded areas 50. The densified fibrous webs 10 and 26 are also free of the particles.

Therefore, the powders-affixed nonwoven fabric of the present invention is different from the fibrous web disclosed in the Groeger Reference, with respect to the absence or presence of the fiber web which is free of the powders or particles.

Further, a means to solve the dropping of particles in the fibrous web disclosed in the Groeger Reference is different from that in the powders-affixed nonwoven fabric of the present invention.

More particularly, in the fibrous web disclosed in the Groeger Reference, the fibrous matrix which carries particles is open and has accessibility to the particles (see column 2, lines 14-18). Therefore, to avoid the drop of particles from the particle-loaded fibrous matrix, the first and second densified fibrous webs 10, 26 and the surrounding area 50, which are densified

fibrous webs impervious to the particles, are necessary (see column 1, line 8 from the bottom to column 2, line 5).

In contrast, the powder materials rarely drop from the powders-affixed nonwoven fabric of the present invention, in spite of the fact that the powders-affixed nonwoven fabric is prepared only from the powders-containing fiber web, because the above fine short fibers are fused to each other as well as the powder materials. Such an advantageous effect of the present invention is not disclosed nor suggested in the Groeger Reference.

Furthermore, the Groeger Reference does not disclose nor suggest the “fine short fibers having a fiber diameter of 4 μm or less and a fiber length of 3 mm or less, and consisting of island components remaining after removing a sea component from islands-in-sea type fibers or fibers derived from mechanically dividable fibers” used in the present invention. Therefore, the powders-affixed and nonwoven fabric of the present invention is different from the fibrous web disclosed in the Groeger Reference, with respect to the use of such fine short fibers.

In this connection, the Office Action indicates that Groeger does not disclose that the fibers having a length of no more than 3 microns” (page 2, lines 14-15), but mentions that “Groeger discloses a bonded nonwoven fabric which comprises fibers which have a diameter of 1-10 microns” (page 2, lines 10-11). However, the fibers having a diameter of 1-10 microns are disclosed in the Groeger Reference only as fibers which may be used in the densified fibrous webs free of the particles, and the Groeger Reference discloses, only as fibers which may be

used in the particle-laded fibrous matrix, “stiffening fibers having a denier of from about 6 to 5,000 or more” (see column 4, lines 25-33). The stiffening fiber is apparently a thick fiber having a diameter of far more than the upper limit (i.e., 4 μm) of the fine short fiber used in the present invention. For example, a polyester fiber having a fineness of 6 denier has a fiber diameter of 24.8 μm . The polyester fiber is described as one of preferred fibers in the Groeger Reference, and has a relatively high specific gravity (1.38) among the commonly used synthetic fibers.

Therefore, the Groeger Reference does not disclose or suggest even the “fine short fibers having a fiber diameter of 4 μm or less and a fiber length of 3 mm or less” as fibers which may be used in the powders-containing fiber web.

In this connection, the reason why such stiffening fibers having a denier of from about 6 to 5,000 or more (i.e., thick fibers) should be used as the fibers forming the particle-loaded fibrous matrix in the fibrous web disclosed in the Groeger Reference is due to the process for manufacturing the fibrous web.

More particularly, in the process for manufacturing the fibrous web disclosed in the Groeger Reference, the fibrous matrix is formed on the first densified fibrous web, and then the particles are distributed in the fibrous matrix (see Claim 1). Therefore, the fibrous matrix must have spaces in which the particles can enter into the fibrous matrix and can be carried. Such a space can be formed from the stiffening fibers having a denier of from about 6 to 5,000 or more,

but not formed from the fine short fibers used in the present invention. If the fine short fibers having a fiber diameter of 4 μm or less are used, the particles cannot enter into the fibrous matrix, and thus cannot be carried.

Therefore, Applicants respectfully submit that it is unobvious to use the fine short fibers having a fiber diameter of 4 μm or less, in the fibrous web disclosed in the Groeger Reference. Still further, the Applicants submit that it is unobvious to use the “fine short fibers having a fiber diameter or 4 μm or less and a fiber length of 3 mm or less, and consisting of island components remaining after removing a sea component from islands-in-sea type fibers or fibers derived from mechanically dividable fibers”.

As described above the powders-affixed nonwoven fabric of the present invention is different from the fibrous web disclosed in the Groeger Reference, with respect to the absence or presence of the fiber web which is free of the powders or particles. Further, the means to solve a dropping of particles in the fibrous web disclosed in the Groeger Reference is different from that in the powders-affixed nonwoven fabric of the present invention. Furthermore, the Groeger Reference does not disclose or suggest the “fine short fibers having a fiber diameter of 4 μm or less and a fiber length of 3 mm or less, and consisting of island components remaining after removing a sea component from islands-in-sea type fibers or fibers derived from mechanically dividable fibers” used in the present invention.

Furthermore, the powder materials rarely drop from the powders-affixed nonwoven fabric of the present invention, in spite of the fact that the powders-affixed nonwoven fabric is prepared only from the powders-containing fiber web, without the densified fibrous webs or the like. Such an advantageous effect of the present invention is not disclosed or suggested in the Groeger Reference. Therefore, the applicants believe that the powders-affixed nonwoven fabric of the present invention is unobvious from the Groeger Reference.

The Haynes et al Reference (US Patent No. 5,962,112)

The Haynes et al Reference discloses a wiper comprising a first web of fibers of at most 50 microns in diameter (claim 1). However, the Haynes et al Reference does not disclose nor suggest the “fine short fibers having a fiber diameter of 4 μm or less and a fiber length of 3 mm or less, and consisting of island components remaining after removing a sea component from islands-in-sea type fibers or fibers derived from mechanically dividable fibers” used in the present invention. Therefore, the powders-affixed nonwoven fabric of the present invention is different from the wiper disclosed in the Haynes et al Reference, with respect to the use of such fine short fibers.

In this connection, the Examiner mentions that “Haynes teaches at col. 2, lines 23-45, the conjugate fibers such as island in the sea fibers are suitable for use in forming nonwoven fabrics” (page 3, lines 9-10). However, the Haynes et al Reference discloses the islands-in-sea fibers, only as arrangement of resin components in the conjugate fibers, but does not disclose the “fine short fibers having a fiber diameter of 4 μm or less and a fiber length of 3 mm or less, and

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consisting of island components remaining after removing a sea a component from islands-in-sea type fibers or fibers derived from mechanically dividable fibers”.

As pointed out by the Examiner, the Haynes et al Reference discloses an “airlying” process to form a fibrous nonwoven layer and a “conform” process to added other materials (such as superabsorbent particles) to the web while it is forming (column 3, lines 37-48 and column 4, lines 1-8). To show the above advantageous effect of the present invention, the applicants prepared and enclose a declaration showing that the powders-affixed nonwoven fabric of the present invention is superior to that prepared by the conform process, with respect to the avoidance of the particle-dropping.

As apparent from the declaration, the powder materials rarely drop from the powders-affixed nonwoven fabric of the present invention, in spite of the fact that the powders-affixed nonwoven fabric is prepared only from the powders-containing fiber web, because of the fusion of the above fine short fibers. Such an advantageous effect of the present invention is not disclosed or suggested in the Haynes et al Reference.

As described above, the applicants believe that the powders-affixed nonwoven fabric of the present invention is unobvious from the Haynes et al. Reference.

The combination of the Groeger Reference and the Haynes et al

As described above, the Groeger Reference and the Haynes et al Reference do not disclose nor suggest the “fine short fibers having a fiber diameter of 4 μ m or less and a fiber length of 3 mm or less, and consisting of island components remaining after removing a sea component from islands-in-sea type fibers or fibers derived from mechanically dividable fibers”. Therefore, the applicants do not believe that the powder-affixed nonwoven fabric of the present invention using such fine short fibers would be easily conceivable from the combination of the disclosures in the Groeger Reference and those in the Haynes et al Reference.

Further, the powder materials rarely drop from the powders-affixed nonwoven fabric of the present invention, in spite of the fact that the powders-affixed nonwoven fabric is prepared only from the powders-containing fiber web, because of the fusion of the above fine short fibers. Such an advantageous effect of the present invention is not disclosed nor suggested in these references.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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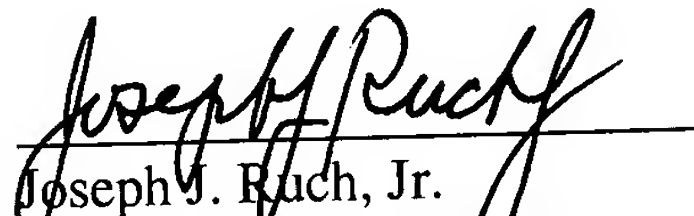
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